of manganese he has obtained, which is of interest from the point of view of the valency of the metal. Fluorine gas reacts readily with powdered manganese, and analyses of the resulting product showed that a higher fluoride than MnF_2 was formed, but owing to the violence of the reaction this fluoride was not of constant composition. The interaction of fluorine and manganous iodide, however, gave a definite fluoride, Mn_2F_6, which in many of its reactions behaves like free fluorine, pentachloride of phosphorus giving PF_5, and amorphous carbon a fluoride of carbon. On heating it splits up into MnF_2 and fluorine gas.

THE additions to the Zoological Society's Gardens during the past week include a Patas Monkey (*Cercopithecus patas*, ♀) from Nigeria, presented by Mr. Cecil Masters; a Macaque Monkey (*Macacus cynomolgus*, ♂) from India, presented by Mrs. Herbert Griffith; a Vulpine Phalanger (*Trichosurus vulpecula*) from Australia, presented by Mrs. Walter Crane; a Persian Gazelle (*Gazella subgutturosa*, ♂) from the Persian Gulf, presented by Mr. B. T. Ffinch; an Alligator (*Alligator mississippiensis*) from North America, presented by Mr. J. Turner Turner; a Ludio Monkey (*Cercopithecus ludio*) from West Africa, a Brown Capuchin (*Cebus fatuellus*) from Guiana, deposited; four Cockateels (*Callopsittacus novae-hollandiae*) from Australia, purchased.

OUR ASTRONOMICAL COLUMN.

SEARCH FOR AN INTRAMERCURIAL PLANET.—*Harvard College Observatory Circular*, No. 48, consists of a description of a plan, prepared by Prof. W. H. Pickering, for observations during the coming eclipse of the sun, with the object of making a thoroughly systematic search for a possible planet revolving between Mercury and the sun. It is not usual for the observatory to arrange expeditions for solar eclipses, except in the case of the trial of a new problem, when grants of money and instruments are made especially for such work.

In explanation of his plan, Prof. Pickering starts with the statement of the observed fact that "the faintness of a star that may be photographed with a given instrument against a *bright* background of sky depends, within certain limits, directly on the focal length of the lens, and is independent of its aperture." It has also been previously pointed out (*Harvard Observatory Annals*, xviii. p. 104) that "three minutes after the pole star first becomes visible to the naked eye in the evening, the sky surrounding it is of about the same photographic intensity as that of the sky near the sun during a total solar eclipse."

Using a photographic lens of 3 inches aperture and 11 feet 4 inches focal length, the field was large enough to cover nine 8 × 10 inch plates. With an exposure of one minute to the region of the pole, about three minutes after the pole star became visible, was sufficient to appreciably darken the plate, but not enough to obscure the images of stars down to the eighth magnitude. *Four* of these instruments will be employed in May next, all attached to the same mounting, and arranged so as to photograph a region about 32° × 10°, having the sun as centre.

As the earth passes through the equatorial plane of the sun only about *one week* after the eclipse, this will be a favourable time for such a search, as the planet would appear somewhere on the narrow line forming the projection of this plane upon the celestial sphere.

The Harvard Expedition for this purpose will be stationed in the State of Alabama, but as even a successful observation at *only one* station will be insufficient to compute the orbit or determine its distance from the sun, it is therefore hoped that some other observer will be able to duplicate the work in Spain or Algeria. Athough, of course, it would be desirable to also employ four cameras, if possible, this is not necessary, and two lenses, one photographing the region on each side of the sun, would, in conjunction with the Harvard plates, be sufficient to confirm the discovery and permit the computation of an approximate circular orbit, which could then be more accurately determined at the next eclipse in 1901.

THE NEW TWIN REFRACTOR AT POTSDAM.—The great refractor which has been installed at the Astrophysical Observatory at Potsdam was recently formally dedicated and prepared for its assigned work. Director H. C. Vogel gave the inaugural address, after which the instrument and its observatory were explained by Prof. Scheiner. The telescope has two objectives, one of 80 cm. (32 inches) aperture and 12 m. (39·4 feet) focal length, and another of 50 cm. (20 inches) aperture and 12½ m. (41·2 feet) focal length. Both objectives were made by C. A. Steinheil and Sons, of Munich, the larger being corrected for photographic, the smaller for visual use. The mounting is by Repsold and Sons, of Hamburg. The dome is 22 m. in diameter and 18 m. high, the hemispherical movable part being of iron with an inner lining of wood; this may be rotated either by hand or by means of electric power. The observing platform is rather unusual, being suspended from the dome, with which it moves, directly opposite the observing slit. The motion of this platform, and the opening or closing of the slit in the dome, are controlled electrically from the eye end of the telescope. The instrument is to be primarily devoted to the determination of the velocity in the line of sight of 500 stars, and the two spectrographs, built specially for the telescope by Toepfer, have passed successfully the preliminary tests. An excellent reproduction of the instrument in position forms the frontispiece of the *Astrophysical Journal* for January 1900, from which the above details have been abstracted.

THE BENJAMIN ALTHORP GOULD FUND.—In the *Astronomical Journal*, No. 477, Messrs. Lewis Boss, Seth C. Chandler and Asaph Hall, Directors of the Fund, make the following announcement:—"Since making appropriations, in March 1899, of 500 dollars to Prof. Charles L. Doolittle, and of 300 dollars to Mr. Henry M. Parkhurst, from the Benjamin Althorp Gould Fund, a considerable amount of income has accrued, for the distribution of which the Directors are prepared immediately to arrange. Applications for appropriations may be made by letter to any of the aforesaid directors, stating the amount desired, the nature of the proposed investigation, and the manner in which the appropriation is to be expended. Full information with regard to the Fund may be found in the announcement pertaining thereto in *A.J.* 453, a copy of which will be mailed, on request, to assist in framing applications."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. H. Woods, St. John's College, has been appointed University Lecturer in Palæozoology.

The Medical School Buildings' Syndicate report in favour of plans for the schools of pathology, pharmacology, public health and medicine, prepared by Mr. E. S. Prior. The estimated cost is about 35,000*l.*

The degree of Doctor of Science is to be conferred on Mr. Charles Hose, of Sarawak, whose contributions to the ethnology, zoology and botany of Borneo have won for him a high reputation.

THE honorary degree of Doctor of Laws has been conferred upon Prof. A. R. Forsyth, F.R.S., and Prof. A. S. Woodward, by Glasgow University.

EVERY student before graduating from the Massachusetts Institute of Technology has to present a satisfactory thesis. Time is allowed for this work in the second term of the fourth year. The theses thus afford students an excellent opportunity to perform original research work. In the course of electrical engineering, a Japanese student has chosen for his subject a study of the size of wire necessary when aluminium is used for a conductor of electricity. He is to study the relative capacity of aluminium as compared with that of copper. As the price of copper has risen so much, and as the price of aluminium has fallen, the use of the latter metal has already begun to compete with that of copper in electrical manufacture. Insurance companies have appointed a committee to follow the results of such tests, and to make tables from them, as it is most important to know, when buildings are wired, the safe limit of the amount of current which any wire covered or uncovered may be made to carry. In the method chosen for determining the relative capacity of the aluminium, the temperature of the wire is measured directly, while the wire is carrying different amounts of electricity.

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EVIDENCE of progress in various departments and grades of education in Liverpool is afforded by the report of the Technical Instruction Committee for the year 1899. Though nothing has yet been done by legislation to improve the local organisation of education, or to promote the unification of local administration, steps have been taken in Liverpool towards the co-ordination of educational effort in the City, and so promote harmonious development. By reconstituting its Technical Instruction Committee so as to include not only educational experts nominated by the City Council itself, but also a considerable proportion of representatives of the School Board, and others nominated by the University College and the secondary schools, a local authority has been established for the administration of technical and secondary education—though the functions of the Committee as regards the latter branch are necessarily for the present mainly consultative and advisory. By bringing within the influence of one administrative body, consisting of representatives from all the recognised important public and professional educational organisations in the City, the various special branches of Technical Education, the Committee hope to ensure the continued success and the progressive development of such work as is required by the needs of the City. As the Committee has been recognised by the Department of Science and Art as an organisation for the promotion of secondary education, it will be free to encourage any branches of technical and higher education which are considered deserving of support.

A RETURN just published as a Blue Book shows that the total amount expended on technical education during the year 1897-8 in England, Wales and Ireland was 860,105*l.*; and that the estimated total expenditure on technical education during the year 1898-9 was 874,612*l.* These amounts are exclusive of the sums allocated to intermediate and technical education under the Welsh Intermediate Education Act, 1889. The amounts raised by loan on the security of the local rate under the Technical Instruction Acts were—in 1897-8, 69,334*l.*; in 1898-9, 133,583*l.* The total amount of the residue received under the Local Taxation (Customs and Excise) Act, by the councils of counties and county boroughs in England (excepting the County of Monmouth) in respect of the financial year 1897-8 was 834,827*l.*, of which 759,400*l.* was appropriated to educational purposes, and 75,426*l.* to relief of rates; the latter sum including 42,108*l.* devoted by the London County Council to relief of rates. The total amount expended on technical education during the year 1897-8 was 826,450*l.*, and the estimated total expenditure during the year 1898-9 was 834,908*l.* The total amount of the residue paid to the thirteen County Councils and the Councils of the three County Boroughs in Wales and Monmouth was 40,062*l.*, and these local authorities are devoting the whole of it to intermediate and technical education, chiefly under the Welsh Intermediate Education Act, 1889. The estimated total amount to be devoted annually to intermediate and technical education, under the Welsh Intermediate Education Act—*i.e.* out of the residue and the local rate—is 43,304*l.* In the case of Ireland, the return shows that the total amount expended on technical education by twelve local authorities during the year 1897-8 was 5649*l.*, and that the estimated total expenditure on technical education by twelve local authorities during the year 1898-9 was 4523*l.*

PROF. ROBERT WALLACE, professor of agriculture and rural economy in the University of Edinburgh, does not agree with the suggestion of the Agricultural Education Committee that, in connection with elementary schools, provision should be made for practical work on plots of ground attached to the schools. In an address delivered a few weeks ago on "Nature Knowledge Teaching introduced by the Scotch Code of 1899" (Edinburgh: The Darien Press), he showed that many educational authorities at home and abroad are of the opinion that farm work at school as a means for training the sons of those who are engaged in agricultural pursuits is impracticable and valueless. Such work would only be playing at farming, and would not rouse into full vigour the real working power of a boy any more than playing at shops develops a knowledge of the laws of commerce. What is wanted is individual interest and responsibility, and a knowledge of principles. The practical work which might usefully be done is stated by Prof. Wallace as follows:—(*a*) Laboratory work, the collection of specimens of all sorts of suitable interesting objects, to form local school museums and home collections. (*b*) The systematic examination of specimens by the aid of lenses and other means. (*c*) The growth, for experimental purposes or for ornament, of a great variety of seeds, and of a select number of plants from bulbs, roots, and cuttings in flower-pots, which, on a scale suitable to the local circumstances, could be duplicated at home by individual pupils, by the pupils from one household, and even by groups of pupils who live contiguous to each other—it being so arranged that each member of the combination should have a right to claim the necessary attention to one or more pots as exclusively his or her own, while the lessons to be learned from all the pots would be common to every one. (*d*) Field demonstrations, in which the objects of interest would be, so to say, infinite in variety. (*e*) And for the benefit of older children and those who have left school, as well as the more enlightened of their parents, school libraries of useful books on rural subjects, which every one could not be expected to possess.

THE address delivered before the Association of Technical Institutions, on January 24, by the President, Sir Swire Smith, just published by the Association, contains many sound remarks upon technical education from the commercial and industrial aspects, and reasons why it should receive the most liberal national encouragement. A University Don once remarked to the parent who wished his son to take up some scientific subject: "Sir, we know nothing of science here, we don't even teach it," and this spirit (unfortunately, not unknown at the present time) is responsible for the prejudice which manufacturers have against the schools and higher education. Place by the side of the disdainful expression referred to, the following testimony of Sir Swire Smith as to the methods and benefits of education in the principles of science:—"In the dual enquiry of the Royal Commission on technical instruction, in which we investigated not only systems of education, but their effect upon industry in this and competing countries, we visited in each foreign country, wherever possible, those eminent industrial establishments whose products were largely exported to the United Kingdom. We followed the processes from the raw material to the finished product, and we interviewed the specialists responsible for excellence or superiority, nearly all of whom had been trained in technical schools. In visiting the schools in which this special knowledge had been obtained, we found students qualifying themselves for their special work in the factory, by pursuing courses of training under excellent teachers and with the most perfect apparatus. We did not see much of what may be called 'trade teaching,' although in some departments of industry, in textiles, for example, the designing, weaving, dyeing and finishing departments were in some cases very complete. The schools in their fundamental principles were claimed to be schools of science or art, *applied* to industry, and in many of the smaller towns the most important schools were teaching pure science and pure art as a basis, with departments for the application of science and art to local industries. The teaching of principles was the same in all the great schools, but in their application there was as much variety as in the industries and crafts to which the teaching was applied. But in following the students from the schools to the workshops and factories, and in ascertaining the effect of their instruction upon their calling, the evidence to my mind was conclusive that the great progress of our rivals may be traced directly to the influences of their schools. And not less convincing were the illustrations of technical training afforded under less favourable conditions than in our own country, proving that the same educational influences had been at work in advancing our own industries." No more sound expression as to what technical education should mean, and what may be expected from it, could be given than is included in Sir Swire Smith's remarks, and they should receive careful consideration from all who are concerned with the progress of national education and the development of our industries.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 25.—"On the Effects of Strain on the Thermo-electric Qualities of Metals. Part ii." By Prof. Magnus Maclean, D.Sc. Communicated by Lord Kelvin, G.C.V.O., F.R.S.

A.—"Thermo-electric difference between free wires and wires previously subjected to longitudinal extension and lateral compression, by drawing them through the holes of a draw-plate."

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